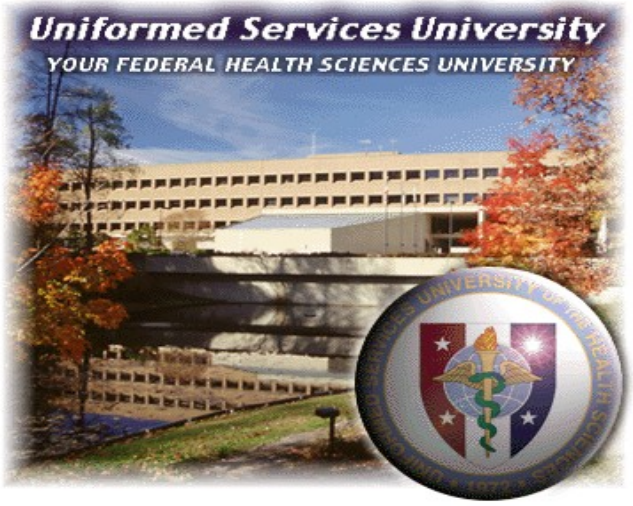
Are we evaluating the right exposures?

Analysis of MSDS accuracy of

dis



LCDR Greg Cook

Uniformed Services University of Health Sciences

Dept. of Preventive Medicine & Biostatistics

Outline

- Background
- How we evaluate exposures
- MSDS (history, function, specifics)
- Review MSDS Studies
- Implications
- Considerations

Findings from analysis of 25 MSDS

What If……

- Hazardous ingredients are not being accurately reported and….
  - Products are being used with health hazard ingredients present at 1% or greater and/or carcinogens are present at 0.1% or greater
  - Products are being used with ingredients comprising less than 1% (0.1% for carcinogens) and exposed employees are exceeding PELs or TLVs.

Background

- 2002 - USS Nimitz
  - CDR G.Hook/CDR P.Smith
    - Formula 150 Paint
    - Analysis revealed substituted benzene compounds not on MSDS

- 2004 - Naval Base Norfolk HAZMINCEN
  - LCDR G.Cook/LCDR G.Morris/CDR G.Hook/CDR P.Smith
    - 25 commonly issued items
    - Analysis to be revealed compounds not on MSDS
    - Quantification of compounds determined

Evaluating exposures

- Process Equipment
- Process Operations
- Raw Materials
- Chemical Inventories
  - Material Safety Data Sheets

OSHA HazCom Standard

- 29CFR1910.1200, “Right to Know”
  - Chemical Labeling
  - Material Safety Data Sheets
  - Hazard Determination
  - Written Implementation Program
  - Employee Training
  - Trade Secrets

Material Safety Data Sheets

- 29CFR1910.1200 mandated information
  - Product information
  - Hazardous Ingredients
  - Physical/Chemical Characteristics
  - Fire or Explosion Data
  - Reactivity Data
  - Exposure Limits
  - Health Hazards
  - Whether the material is a carcinogen
  - Precautions for Safe Handling and Use
  - First Aid Measures

Hazardous Ingredients

- 29CFR1910.1200 mandated MSDS information

  - Physical hazard components
  - Chemical & common names of single substances
  - Chemical & common names of mixture components
  - Chemical & common names of ingredients ≥1%
  - Chemical & common names of carcinogens ≥ 0.1%
  - Chemical & common names of ingredients ≤1%/0.1% if can exceed PEL/TLV and present health risk

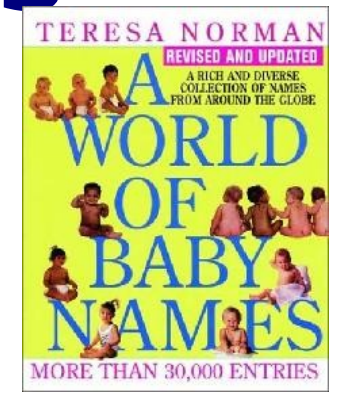
Hazardous Ingredients

- 29CFR1910.1200 mandated MSDS information

- Chemical & common names: for both mixtures and individual chemicals

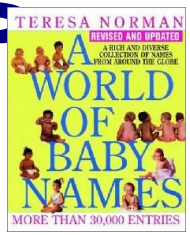
Chemical & Common Names

- What's in a name


TERESA NORMAN
REVISED AND UPDATED
A RICH AND DIVERSE COLLECTION OF NAMES FROM AROUND THE GLOBE
A WORLD OF BABY NAMES
MORE THAN 30,000 ENTRIES

- phenyl methane
- methyl acetone
- Cumene
- Hemellitol
- Mesitylene
- butylene hydrate

Chemical & Common Names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MORE THAN 30,000 ENTRIES

- What's in a name

phenyl methane	toluene / methyl benzene / methyl benzol
methyl acetone	MEK / 2 butanone
Cumene	1,2,4 trimethylbenzene
Hemellitol	1,2,3 trimethylbenzene
Mesitylene	1,3,5 trimethylbenzene
butylene hydrate	2 butanol / sec-butyl alcohol / methyl ethyl carbinol

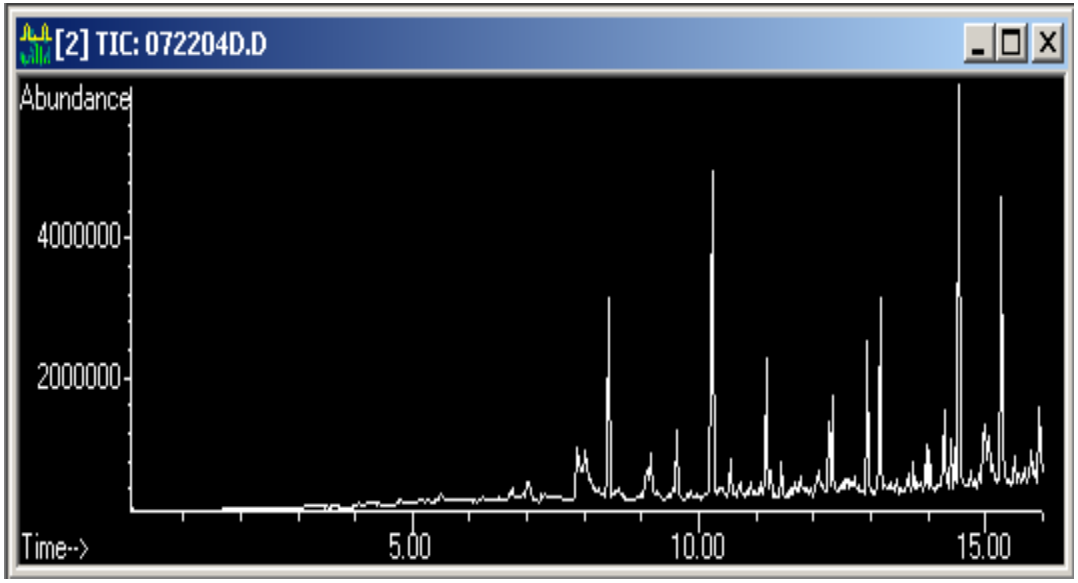
1% / 0.1% or greater

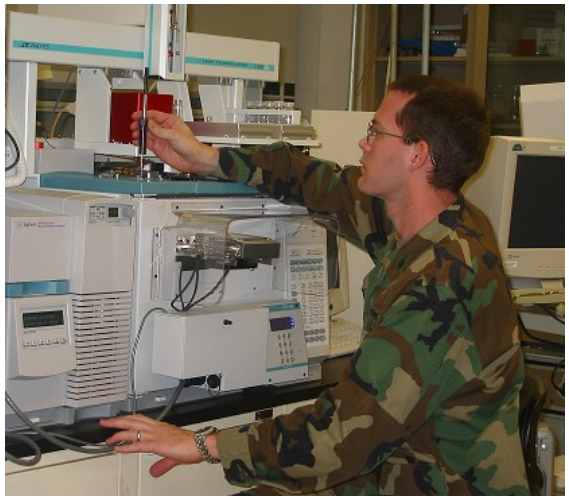
- 29CFR1910.1200 mandate the MSDS

  - Chemical & common names of ingredients ≥1%
  - Chemical & common names of carcinogens ≥ 0.1%
  - Chemical & common names of ingredients ≤1%/0.1% if can exceed PEL/TLV and present health risk

Sampling & Analysis

- Collection - HazMinCen, Naval Base Norfolk
- Initial Screening - LCDR Cook (AFRRI)





Sampling & Analysis cont'd

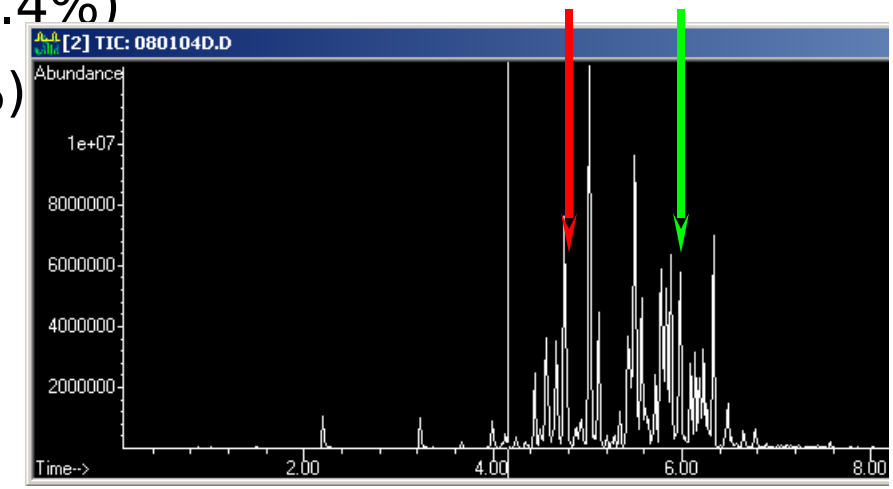
- Quantification
  - EPMU 2
  - GC/FID
  - % wt/wt

Results

- **25 MSDSs**

- **3 did not list hazardous ingredients found to be >1%**
  - Walkway, nonslip compound (Toluene 3.2%)
  - Epoxy Coating (Xylene 1.4%)
  - Epoxy primer (MIBK 1.4%)

- **1 to be re-analyzed**
  - PRC decking



Results (more closely)

- Walkway, nonslip compound
  - VM&P Naphtha
    - MEK, Cyclohexane, **Toluene**
- Epoxy Coating
  - Naphtha, Toluene, MEK
    - Ethylbenzene, Tri-methylbenzenes, **Xylene**
- Epoxy primer
  - Naphtha
    - MEK, Toluene, **MIBK**
- PRC Decking
  - (*no aromatics listed on MSDS)
    - MIBK, Toluene, **Ethyl benzene, Xylene**

MSDS Studies

- **What they are / How to Use**
  - Health & Safety, Manufacturing, Industrial Magazines
- **Preparation / Completeness / Improvement**
  - U.S.GAO, OSHA, HMIRC, OMOL
- **Hazard Ingredients / Determining Exposures**
  - Australia ‘97 - epoxy resin coatings
  - Finland ‘97 - dental acrylic products
  - Canada ’00 – airline industry products

How do we proceed?

- **Practical**
  - Be skeptical
  - Be thorough
  - Be aware
  - Prioritize
  - Field Instrumentation
  - Ask additional questions
  - Share

- **Impractical**
  - Hydrocarbon screening
  - Fishing

Follow-up

- Review NEHC database for air sampling data
- Conduct air sampling to evaluate exposures for ingredients identified at >1% and not on MSDS
- Conduct air sampling to evaluate exposures ingredients <1%

Conclusion

- Certain susceptibility of incomplete or inaccurate hazardous ingredients disclosure on MSDSs
- Currently, no effective process for detecting inaccuracies
- Implement practical techniques to improve recognition of potential chemical hazards

Special Thanks

- CDR Phil Smith – NAVHOSP San Diego
- CDR Gary Hook – USUHS
- LCDR Gary Morris - USUHS
- Ms. Helen Penn – EPMU 2
- Ms. Mary Eide – OSHA Technical Center
- Ms. Leslie Crowder – NEHC

Questions

Products Analyzed

- Walkway, nonslip compound; Akron Paint & Finish (8010-00-641-0426) gray
- Epoxy Coating, parts A & B; Crawford Labs (8010-01-419-1155) gray
- Intershield Proreco 159/151, A & B; International Paint (8010-01-461-5163) orange
- Intershield Proreco 609/611 A & B; International Paint (8010-00-N09-0170) clear
- Epoxy Polyamide Primer, parts A & B; Deft (8010-01-387-1069)
- Polyurethane CARC, parts A & B; Niles (8010-01-141-2419) black
- Semi-gloss; Sherwin Williams (8010-01-344-5322) blue white
- Latex Paint; Durant (8010-01-333-9820) blue
- 565 Plus XLO insecticide (6840-00-823-7849)
- Permethrin arthropod repellent (6840-01-278-1336)
- Dura Plate UHS Epoxy; Sherwin Williams (8010-01-344-5322) white
- ArmorSeal 350 non-skid epoxy, parts A & B; Sherwin Williams, deck gray
- Epoxy Primer, parts A & B; Sherwin Williams (8010-01-309-0329) buff
- Polyurethane CARC, parts A & B; Deft (8010-01-354-0963) gray

OSHA 95

– These MSDSs were reviewed by an IH and Occ Phy. They determined accuracy of health effects data, first aid procedures, rating for ppe information, correct listing for applicable exposure limits (37% had accurate health effects data; 76% had accurate first aid procedures; 47% had an accurate rating for ppe information; 47% had the correct listing for applicable exposure limits)In reviewing the hazardous ingredients information section 8 listed “not applicable” or “no hazardous ingredients” (if the case, then no need for an MSDS) but 7 of 8 gave first aid procedures and recommended PPE; 3 provided nonspecific chemical names; 5 listed “trade secrets” that would require further research.

Canada ’00

-Human Resource Labour Program auditing project

- 3 MSDSs (synthetic lubricant; aircraft cleaner detergent; epoxy reducer)
  - Hazardous ingredients detected at >1% in all cases
- Overall (n=24) 17% non disclosure case rate

- Synthetic lubricant hydraulic lifts- The two hazardous ingredients disclosed in the MSDS for this sample, hydroxytoluene and sodium alkyl benzene sulfonate, were verified within the ranges reported. Two hazardous ingredients not disclosed in the MSDS for this sample, dimethylaminoethanol and 2-(2-butoxyethoxy)-ethanol, were found at concentrations of 2.3% & 2.4% wt, respectively.
- liquid detergent used for cleaning aircraft exteriors - No hazardous ingredients were disclosed in the MSDS Chromatography revealed one hazardous ingredient, 2-butoxyethanol , at a concentration of 8.3 percent.
- epoxy reducer and cleaner, airline hanger - The three hazardous ingredients disclosed in the MSDS for 2-propanol , dimethyl benzene, and 4-methyl-2-pentanone were not detected. Instead, three other